

**The Malawi Surgical Initiative  
at Kamuzu Central Hospital:  
A Program and Evaluation Plan**

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## **Abstract**

Kamuzu Central Hospital, representing the Ministry of Health of Malawi, partnered with University of North Carolina in Chapel Hill and the University of Bergen in Norway to create the Malawi Surgical Initiative (MSI). The Malawi Surgical Initiative is a permanent, in-country, surgical training program at Kamuzu Central Hospital in Lilongwe, Malawi. The primary goal of the MSI is to develop the surgical workforce and increase surgical capacity in Malawi. A mini-literature review was compiled to give insight on the current status of surgical training programs in Africa. The program plan outlines the partnership and program development. The program evaluation plan will be used to assess areas of improvement and to ensure success in meeting program goals and objectives. The Malawi Surgical Initiative may be a model for developing surgical training programs in Africa.

## **Introduction**

Paul Farmer and Jim Kim (2008)<sup>1</sup> claim surgery as the “neglected stepchild of global health.” An estimated 11% of global burden of disease can be attributed to surgical conditions with 38% due to injuries, 19% to malignancies, 9% congenital anomalies, and 6% due to pregnancy complications.<sup>2</sup> Only 26% of the 234 million operations worldwide are performed in developing countries, which accounts for 70% of the global population.<sup>3</sup> Africa has the highest ratio of surgical disability adjusted life years (DALYs) lost per 1000 people, yet has only the equivalent of 1% of the number of surgeons in the United States.<sup>4</sup>

The Malawi Surgical Initiative was established to address the dire surgical needs within the country of Malawi. The Malawi Surgical Initiative was developed by a tri-partite partnership between the Malawian Ministry of Health, University of North Carolina in Chapel Hill, and the University of Bergen in Norway. The primary goal was to develop a permanent and sustainable surgical training program at Kamuzu Central Hospital in order to increase the surgical capacity and workforce in Malawi. The following document includes a literature review of the current published evaluations of surgical training programs in Africa for insight in developing the future program plan and evaluation. The program plan outlines the history of the partnership and program development now and the future. The program evaluation plan outlines assessment for areas of improvement and in order to ensure success in meeting program goals and objectives. With these tools and resources, the Malawi Surgical Initiative may be a model for developing surgical training programs in Africa.

# **Systematic Review: Evaluation of Surgical Training Programs in Africa**

## **Introduction**

Surgical conditions comprise of about 11 percent of the global burden of disease, with 76 million disability adjusted life years (DALYs) caused by road injuries worldwide and 4 million DALYs by obstetric complications in Africa alone.<sup>5,6,7</sup> For most parts of sub-Saharan Africa, there is only one surgeon for every 250,000 people and one for every 2.5 million people in rural areas.<sup>5</sup> To address the need for a surgical workforce in Africa, three colleges of surgery were established in sub-Saharan Africa. The oldest was formed in 1962 and has 18 members in the West African College of Surgeons. The College of Surgeons of East, Central, and Southern Africa has 9 member countries and was established in 1999. South Africa founded their own, the South African College of Surgeons.<sup>5</sup> While developing the program plan and evaluation for the Malawi Surgical Initiative, I inquired if there were similar programs and their methods for evaluating surgical training programs in Africa. My two primary questions are:

1. Are there surgical training programs in Africa for the development of the local surgical workforce?
2. If so, what kind of evaluation process do these programs use?

## **Methods**

I performed a literature search to identify surgical training programs in Africa, specifically evaluations of those programs. I used the following MeSH terms in Pubmed to find such program evaluations: “surgery” AND “internship and residency” AND “Africa” AND “program evaluation,” which yielded 7 results. A broad PubMed search was also performed with: “general surgery” AND “residency” AND “global,” and yielded 115 results. I reviewed all of the titles and abstracts and chose 5 articles based on the following inclusion and exclusion criteria.

Inclusion criteria included a quantitative and/or qualitative evaluation of a surgical training program or training elective in Africa between partners from developed and developing countries. These programs are specifically for the development of the local surgical workforce. I excluded US residents' surgical experiences abroad or international health electives for residents from developed countries. The Mutabdzic *et al.* (2012)<sup>8</sup> article is the only pre-program evaluation for a surgical training program in Africa.

### **Results (see Table 1)**

#### **Pollack *et al.* Is it Possible to Train Surgeons for Rural Africa? A Report of a Successful International Program**<sup>5</sup>

Established in 1997 to address the need for surgical manpower in Africa, the Pan-African Academy of Christian Surgeons (PAACS) in collaboration with Loma Linda University and the College of Surgeons of East, Central, and Southern Africa (COSECSA) have created six surgical training programs in four countries. There were 5 general surgery and one pediatric fellowship programs located in Gabon, Ethiopia, Kenya, and Cameroon. PAACS provided legal and administrative support while Loma Linda University provided on-site visits and academic evaluation. The training programs were accredited through COSECSA and applied to the West African College of Surgeons (WACS). Two general surgery programs and a pediatric fellowship had 5-year fellowship level accreditation. The other programs had 2-year membership level accreditation and were working towards the 5-year accreditation level. Private donors, churches, and foundations have funded the programs.

The purpose of the article was to evaluate the surgical training program in rural Africa. In 2010-2011, there were 35 residents and fellows in training. Each site had 3 to 8 trainees with an average of 1,400 to 7,500 cases annually. Majority of cases were general surgery and obstetrics

and gynecology, followed by orthopedics and urology. The American competency-based curriculum consisted of operating room teaching, rounds, patient care, and reading with presentations, papers, and weekly didactics. Residents were taking weekly and annual written and oral examinations to assess academic progress and to prepare for accreditation exams by COSECSA and WACS. The in-training examinations have met reliability indices consistent with the American Board of Surgery In-Training Exam (ABSITE) and the American Board of Surgery Qualifying Exam. The program directors were board certified by either the American Board of Surgery or the Royal College of Physicians and Surgeons of Canada. Most of the full-time faculty was fellowship certified by WACS or COSECSA. One hundred and eighty subspecialists have visited these training sites to teach specialty surgical skills. The hospitals were required certain logistical standards in order to meet accreditation to become a teaching hospital.

By 2010, there were 18 surgeons who completed training. Of the 18, one graduated from the pediatric surgery fellowship and two were enrolled. One trained in orthopedics and all except two practiced general or pediatric surgery in rural areas in Africa. The other two graduates served in underserved urban areas before the requirement of rural service was introduced to the program. After completion of the training program, residents are required to serve in rural hospitals in Africa for every year of training completed. Out of 54 acceptances into the program, 10 residents left, 4 changed specialties, and 6 were dismissed due to various reasons.

In spite of the shortage of the surgical workforce, the limited resources, and lack of specialty training, PAACS has developed this surgical training program to address those needs. The biggest challenges noted were sustainable funding and shortage of long term faculty. Recruitment of trainees can be difficult with the “brain drain” and due to changing to high-

paying specialties paid by non-governmental organizations. Accreditation is limited by lack of hospital resources and personnel in rural areas. PAACS is in the progress of working with each country's ministry of health to ensure long term viability. They propose the solution to increasing the global surgical workforce will require a "personal, organizational, country-wide, and worldwide" initiative and the in-country surgical training programs are a good start.

Ekenze and Ameh. Evaluation of relevance of the components of Pediatric Surgery residency training in West Africa<sup>9</sup>

Sebastian O. Ekene and Emmanuel A. Ameh from University of Nigeria Teaching Hospital and Ahmadu Bello University Teaching Hospital, respectively, in Nigeria, performed this study to evaluate if the pediatric surgical training programs in West Africa adequately prepared pediatric surgeons for post-training practice. The evaluation consisted of a cross-sectional self-administered survey to the 36 pediatric surgeons trained in one of the 19 WACS-accredited pediatric surgical training centers in West Africa.

The WACS pediatric surgery training consists of a 24 month junior residency with emphasis on standard surgical and operative principles and pathology and a 30-month senior residency on general and specialized pediatric surgery, trauma care, and research. Each part involves formal written and clinical examinations to qualify for fellowship status in WACS. Since the formation of the WACS pediatric training programs in 1980 to the date of this publication, 41 fellows have completed the program and 36 practice in West Africa.

At WACS meetings, 26 of the 36 pediatric surgeons completed the survey. Twenty-two were practicing in academic centers and 2 out of 4 who were in private practice would teach part-time. Twenty-one trained exclusively in West Africa and 5 had additional training in Europe.



Table 1. Evaluations of Surgical Training Programs in Africa

Article	Pollock et al. (2011)	Ekenze and Ameh (2010)	Khambaty, Ayas, and Mezghebe (2010)	Ezeome et al. (2009)	Mutabdzic et al. (2012)
<b>Study Purpose</b>	Is it possible to train surgeons for rural Africa?	Does the pediatric surgery residency training program in West Africa address the realities of post-training practice?	Evaluation of the 1 year old postgraduate medical education program in Eritrea	Evaluation of the Enugu Basic Science Skills Programme	Designing a Contextually appropriate surgical training program in low-resource settings
<b>Evaluation Method</b>	Case load, Number of Trainees and locations, Case types, Curriculum and examinations	Cross-sectional survey (self-administered questionnaires) of 36 pediatric surgeons trained in West Africa	Change in case load, length of stay, antibiotic use, and intravenous fluid use before and after program implementation	Pre- and Post-course evaluation by trainees	Case numbers and local surgical opinion; pre-program evaluation
<b>Location(s)</b>	Lebamba, Gabon Sodd, Wollaita, Ethiopia Bamenda, Cameroon Kijabe, Kenya (2) Bomet, Kenya	19 accredited training centers in West Africa	Halibet Hospital and Orotta Hospital in Asmara, Eritrea	Nigeria (3), Senegal, Ghana, and Sierra Leone	Princess Marina Hospital in Gaborone, Botswana
<b>Partnership(s)</b>	Pan-African Academy of Christian Surgeons (PAACS), Loma Linda University, College of Surgeons of East, Central, and Southern Africa (COSECSA)	West African College of Surgeons (WACS) and multi-institutional and international collaborations	The Partnership for Eritrea: George Washington University Medical Center, Physicians for Peace, and the Eritrean Ministry of Health	Association of Surgeons of Great Britain and Ireland (ASGBI), West African College of Surgeons (WACS), Johnson and Johnson Corporation	University of Botswana, University of Toronto, Princess Marina Hospital and Botswana Ministry of Health
<b>Accreditation</b>	COSECSA, application to West African College of Surgeons (WACS)	WACS	George Washington University Medical Center's standard of surgical excellence	WACS	Not Applicable

<b>Criteria for Recruitment of Residents</b>	African graduates of recognized medical schools, less than 38 years old, valid medical license in home and training program, proficient English	Not mentioned	Graduates from Orotta School of Medicine	No specific criteria mentioned; open to surgical faculty, residents, and other	Graduates from University of Botswana
<b>Number of Trainees</b>	35 residents	26 responses/36 pediatric surgery fellows	5 Eritrean general practitioners	103 trainees – including 2 consultant surgeons, 10 senior registrars, and 91 senior house officers/registrars	Not Applicable
<b>Annual Case Load</b>	1400-7500 avg cases annually depending on site	Not mentioned	2665 – 3104 cases per year	10 procedures	1020-1313 cases per year
<b>Type of Cases</b>	General surgery, (38% of total cases), Obstetrics and gynecology (32%), Orthopedics, (15%), and Urology (15%)	Pediatric Surgery: Gastroenterology, Neonatal Surgery, Trauma, Oncology, Urology	General surgery, urology, orthopedics, otolaryngology, neurosurgery, endoscopy, vascular, maxillofacial surgery	See below	Burns and skin grafts, vascular and amputations, Abdomen, Alimentary tract cases majority
<b>Curriculum</b>	American competency-based model	WACS Curriculum	American competency-based model	Theatre safety, knot tying, incisions, suturing, intestinal anastomosis, vascular repair, tracheostomy, tub thoracotomy, plaster of paris application, tendon repair	SCORE curriculum + Logical Surgical repertoire + logical surgical opinion
<b>Funding</b>	Budget: US\$460,000; Private donors, churches, foundations	Not mentioned	Physicians for Peace	Johnson and Johnson Corporation	Not mentioned

Greater than 81% of the pediatric surgeons claimed to have adequate training in neonatal surgery, pediatric urology, gastroenterology, oncology, and trauma. Only 61.5% felt they had adequate exposure to hepatobiliary surgery and 54% for burn management. All of these were claimed to be useful in real practice. Prenatal diagnosis and management were rated as useful to know by 62% but only 15% were exposed to it in training. There were minimal exposure to laparoscopic and microvascular surgeries and were also thought to be not as useful by 62%. Adequate exposure of 7 out of 11 non-surgical components in training matched with usefulness, such as communication skills, ethical decision making, time management, medical research, and mentoring. Hospital administration and finance management matched for the least exposure and the least useful. Office and pediatric unit management were rated useful, but with lower exposure. Majority (85%) recommended establishing children's hospitals in the area with more resources, training, research, and mentoring. Fifty-eight percent suggested rotating through more than one center during training.

Overall, the pediatric surgical training programs adequately prepare pediatric surgeons in the area. Although specialists may be available at tertiary centers, general pediatric surgeons usually are performing specialty cases, such as urology, burns, and trauma care. The lack of laparoscopic surgery in developing countries reflects the minimal exposure and ranking of least useful. Management skills should be incorporated into training. Through this evaluation, the authors propose that training can be improved by multi-institutional and international collaboration in order establish adequate facilities for structured rotations and specialty and nonsurgical skills training.

*Khambaty, Ayas, and Mezghebe. Surgery in the Horn of Africa: A 1-year Experience of an American-Sponsored Surgical Residency in Eritrea<sup>10</sup>*

The Partnership for Eritrea is a collaborative between George Washington University (GWU) Medical Center's academic and administrative expertise, Physicians for Peace's financial support, and the Eritrean Ministry of Health's support for in-country coordination. The general surgery residency was started in January 2008. The program was in the process of accreditation and was currently going through GWU Medical Center's standard of surgical excellence. The residents rotated through the general public Halibet Hospital with 45 surgical beds and with two full-time general surgeons averaging 1000 cases a year. They also rotated through Orotta Hospital with the Orotta School of Medicine, which has 5 full-time surgeons performing 2500-3330 general, pediatric, neurosurgical, and maxillofacial surgeries a year. There are 5 Eritrean faculty surgeons and visiting surgeons from the US, Europe, and Cuba. The Eritrean faculty was provided a development seminar to guide training residents. Visiting specialty surgeons have contributed to the curriculum. One of the authors of this study, Fatima M. Khambaty, lived in Eritrea and became the surgical training program director.

The program curriculum was based on the American competency-based model with lectures, daily operative learning and weekly outpatient clinic, and monthly morbidity and mortality conferences. US or European surgeons give annual in-training written and oral examinations. The curriculum includes general surgery, urology, orthopedics, otolaryngology, neurosurgery, endoscopy, and some maxillofacial, vascular, and laparoscopic surgery. The residents also rotate in rural community settings. Five Eritrean general practitioners with post-graduate experience were in the first residency class.

The evaluation compared the number of operations, resources used, average length of stay of patients one year before and one year after the residency program started in 2008. There was a 17% and 16% increase in operations at Orotta and Halibet Hospitals, respectively, with an average of 35 operations a month for each resident. Even though patients traveled from far and remote places, the length of stay by patients decreased by 15%. The use of antibiotics and intravenous fluid bags decreased by 42% and 44%, respectively. The benefit of decreased use of resources was calculated to save about the equivalent of 4.8% of the Orotta Hospital's annual budget.

The Partnership believes that this program may be a model for developing surgical residency programs in other developing countries. Through this evaluation, establishment of the general surgical residency program has been shown to improve surgical care in Eritrea.

*Ezeome et al. Surgical training in resource-limited countries: moving from the body to the bench – experiences from the basic surgical skills workshop in Enugu, Nigeria<sup>11</sup>*

This program evaluation was not on a surgical residency training program. It addressed a basic surgical skill (BSS) workshop incorporated into the West African College of Surgeons (WACS) curriculum. The Association of Surgeons of Great Britain and Ireland (ASGBI) has been teaching this course in Africa since 2001. With partnerships with WACS and Johnson and Johnson Corporation, ASGBI had their first session in West Africa at two centers in Enugu, Nigeria, in 2006. Since 2006, WACS has expanded the BSS program to six centers in West Africa (three in Nigeria and one in Senegal, Ghana, and Sierra Leone). Although Johnson and Johnson has been funding most training centers, some BSS program centers have made adaptations of necessary supplies with local resources.

The BSS program involves hands-on instructions adhering to basic principles of safety, open surgery, and surgical techniques related to trauma and orthopedics. One hundred and three surgeons from general and specialty fields in Eastern Nigeria have participated in this program. Ninety-six percent never participated in a formal basic surgical skills training before. A number of participants indicated low pre-course exposure and confidence with basic surgical skills such as suturing and knot tying. All components of the course received high ratings by the participants with intestinal anastomosis, knot tying, vascular repair, and suturing as the most useful components of the program. Sixty-five percent of the participants claimed that there was not any component that was not useful. Feedback included the desire for the program to be mandatory for surgical residents. Also, there were requests for more useful procedures and basic resuscitation techniques. WACS have made adaptations to the program for sustainability.

The BSS program was such a success that WACS has required the program as a prerequisite for taking the Part 1 Fellowship Exam since April 2010. The BSS program is an example of how a North-South relationship can empower leadership in developing countries to adapt and maintain useful and locally relevant programs in their countries.

*Mutabdzic et al. Designing a Contextually Appropriate Surgical Training Program in Low-resource Settings: The Botswana Experience*<sup>8</sup>

A country of 1.95 million people, Botswana has only 27 surgeons with only 3 local surgeons who trained overseas and 24 expatriate surgeons who travel in and out of the country. With the opening of the University of Botswana's School of Medicine in 2009, residency programs in internal and family medicine, public health, and anesthesia started in 2010 at the Princess Marina Hospital in Gaborone, Botswana. The University of Botswana partnered with the Botswana Ministry of Health and University of Toronto to design an appropriate surgical

training curriculum by evaluating the local surgical logbooks and using local surgical opinion. The Surgical Council on Resident Education (SCORE) curriculum was used as a template.

Princess Marina Hospital's surgical logbooks from 2004 to 2010 were calculated, coded, and aggregated using the American Medical Association Current Procedural Terminology (CPT) codes and the Accreditation Council for Graduate Medical Education (ACGME) defined categories. By comparing the case numbers to minimum required for a general surgery resident in the United States, they were able to identify the hospital's capacity and operative experience for future surgical trainees. Skin grafts associated with burns and amputations were common while laparoscopic cases were less common. General surgical training in Botswana will have to include specialty training in plastics and vascular to meet the local needs. The number of some types of surgical cases was low, but the majority of ACGME categories were beyond the minimum requirements for case numbers. Given the results and with pre-existing relationships with American academic institutions, they decided that an American competency-based model would be an appropriate framework for design. Local surgical opinion had the greatest weight of what needs to be emphasized in the curriculum. While inflammatory bowel disease is rarely seen, surgical management of infectious disease, skin grafts, and amputations are common procedures that will need to be mastered by trainees in Botswana. Limitations to their analysis included exclusion of clinic or casualty data, data from private or rural hospital settings, and the ambiguity of the recorded data. They also received feedback at international meetings from residents at other training programs in Africa.

Implementation will still be a challenge, as faculty positions need to be filled and trained, staff at PMH need to be trained, and the first phase of medical students will be graduating. However, the authors believe that the pre-program evaluation gave great insight to developing a

contextually appropriate program for the University of Botswana. Their main goal is to design a program with local ownership. Their approach can be a potential model for creating relevant surgical training programs in other low-resource settings.

## **Discussion**

These five surgical training programs are similar to my program by location, partnership dynamics, and goal to increase and empower the local surgical workforce in Africa. Although the three colleges of surgeons have been present for a while, surgical residency training programs in Africa are relatively new with increasing availability of surgical infrastructure.

With the young age of the programs, evaluations can only include curriculum structure, case loads, case types, and number of trainees. However, these evaluations are useful in improving and appropriately structuring programs to meet local needs. As time passes and more programs are established, hopefully more evaluations will be completed and show improvement in building and retaining the surgical workforce and improving clinical care in Africa. The brain drain and lack of resources, mentors, and funding will always be challenges to this goal.

Intercollegiate relationships and collaboration with effective communication will be necessary to create successful surgical training programs in Africa.



## **Malawi Surgical Initiative at Kamuzu Central Hospital: Program Plan**

### **Overview of Surgery in Malawi**

Malawi is a landlocked Sub-Saharan African country with 14 million people and only 15 trained surgeons of any specialty in the country.<sup>4,12</sup> Malawi's government hospital system is composed of 4 central hospitals and 21 district hospitals. The central hospitals are in major cities (Blantyre, Lilongwe, Zomba, and Mzuzu) and are tertiary care centers. There are one or more surgeons at each of the central hospitals. The district hospitals are scattered across the country and provide basic medical care. Each district hospital is staffed with a physician, who usually has recently graduated from internship and is the designated district health officer (DHO) of their area. There are two or more clinical officers (CO) with only 3-4 years of training.<sup>4,12</sup> Although there are operating theaters in district hospitals, there are no surgeons.<sup>12</sup> Surgeons at central hospitals periodically run clinics and operate at district hospitals.<sup>12</sup> In 2003, 48,696 surgical operations were recorded in government hospitals with 25,053 in district hospitals and 23,643 in the four central hospitals.<sup>12</sup> Caesarean sections and dilatation and curettage were the most common surgical procedures and most were done in district hospitals. The two most common general surgeries were laparotomy and hernia repair, mainly performed in central hospitals.<sup>12</sup> The types of surgeries performed at district hospitals reflect the lack of surgical manpower to do more complex surgeries and limitations of clinical officers.

### **Program History and Context**

There is only one medical school in Malawi, the Malawi College of Medicine in Blantyre, affiliated with the Queen Elizabeth Central Hospital. There are only two accredited surgical residency programs, one at the Malawi College of Medicine and the other being the Malawi

Surgical Initiative at Kamuzu Central Hospital (KCH) in Lilongwe. KCH is a 1000-bed referral center for about 5 million people in central Malawi. KCH has four operating theaters, a 24-hour casualty department, an intensive care unit, a high dependency unit, and basic radiology services.<sup>13</sup> There is no computed tomography, magnetic resonance imaging, or pathology available at KCH.<sup>13</sup> The presence of UNC's Institute for Global Health and Infectious Diseases has been well established in KCH for more than 20 years.

In 2006, although UNC and KCH were making advances in combating HIV/AIDS, the UNC Project and the Ministry of Health realized that a major cause of death in the area was due to trauma. At that time, there were two general surgeons and two urologist; all dedicated to serving at KCH, but none were native to Malawi. Surgeries were being performed, but the demand was greater. In partnership with KCH and the Ministry of Health, the UNC Department of Surgery and the University of Bergen with the Norwegian government became involved in addressing the need for surgery and for a sustainable surgical workforce in KCH and in Malawi.<sup>4</sup> Each member of the tripartite partnership contributed financially and with manpower for the development of the surgical training program. The hospital was sufficiently equipped with necessary surgical and supporting services to foster a dynamic surgical training program. The surgical residency training program was established following guidelines and accreditation through the College of Surgeons of East, Central and Southern Africa (COSECSA). While local surgeons and staff are hired by the country's Ministry of Health, the residents are carefully chosen by both UNC and the Ministry of Health with equal division of financial support for residents' salaries. The University of Bergen has contributed to financial and logistical support of the surgical and staff personnel and physical infrastructure.

Working with the existing surgical leadership at KCH, UNC and University of Bergen have been pivotal in helping to develop the training program. There is mutual respect and support between colleagues of the tripartite partnership. Visiting surgeons and residents have learned innovative clinical and surgical skills by working with KCH surgeons, who were well versed in operating in resource limited settings. KCH surgeons and residents benefited from learning new clinical and surgical skills from visiting surgeons and residents from both UNC and University of Bergen. Majority of the hospital staff were pleased and receptive with the development of the training program. It was important to address the needs of the staff in order to develop cohesive training teams. At first, the clinical officers were not receptive to the program because of the lack of benefit from their part. The leadership responded by expanding the surgical training program to include specialized training in burns and critical care for clinical officers. With the development of the program, the Ministry of Health hired more nurses for surgical and inpatient support. The development of the training program changed the community's perception of the UNC-Malawi partnership from a research-minded one to one of empowerment and care for the people for the long term. Also, with more manpower, more surgeries were able to be performed to meet the need for trauma surgery in Lilongwe. Through the surgical training program, it seems possible to have a balanced relationship between U.S. and foreign academic departments of surgery and hospitals in developing countries.

Although there is a strong tripartite partnership and a well-developed training program, there are always challenges and opportunities for improvement. One concern is the financial stability and sustainability of the program. The logistics of research is another aspect of the training program that will need to be developed. While recruitment of residents has not been a problem, geographical barriers are still a challenge as the only medical school in the country is

based in Blantyre, over 200 kilometers away from KCH. To address the “brain drain” phenomenon and for sustainability, the program recruits only those medical students from Malawi. As the program progresses, communication will be important to effectively address the needs of all parties involved.

### **Program Theory**

The Malawi Surgical Initiative’s approach was for organizational partnership. The problem was identified by KCH and the Malawian Ministry of Health. The need was for adequate surgical manpower to address the many deaths by trauma, one of the major causes of death in the country. The initiation of action occurred when all three stakeholders came together to develop the surgical training program. The prior relationships between the Malawian Ministry of Health with UNC and the Norwegian government allowed for effective partnership and trust.

In order to establish the surgical training program, the institution and curriculum had to be approved by the College of Surgeons of East, Central and Southern Africa (COSECSA).<sup>14</sup> New resources, such as surgical equipment and ancillary staff, were assembled according to guidelines and strategic planning. The training program was first implemented in 2009 as a 2 year plan until re-evaluation by COSECSA. In 2011, the program was approved for another 5 years by COSECSA. The surgical training program has become institutionalized into KCH and the UNC-Malawi Project. The UNC-Malawi Project includes not only the surgical department, but also partnership with UNC’s Institute for Global Health and Infectious Diseases and UNC’s Obstetrics-Gynecology Department. Full institutionalization of the program will be possible with re-certification by COSECSA and implementation of a plan for sustainability.

Through organizational change and development of the surgical training program, future Malawian surgeons are empowered to gain applicable surgical skills and the ability to save lives in their own country.<sup>15</sup> The country identified a need for not only how to save lives, but also to address the need for a surgical workforce. Working together, the tripartite partnership is not only strengthening international relationships, but most importantly, empowering Malawians to address future needs in surgery and health.

### **Goals/Objectives and Logic Model**

**Goal: Develop a sustainable surgical training program in Malawi.**

#### ***Short-term Objectives***

- 1. Every year, implement curriculum and schedule as necessary.**
  - a. Activity – Modify schedule based on local and visiting surgeons.
- 2. Every year, recruit new residents into the program.**
  - a. Activity: Visit Malawi College of Medicine to actively recruit new interns.
  - b. Activity: Allow medical students from Malawi College of Medicine or native Malawian medical students from other medical schools to rotate through Kamuzu Central Hospital.
  - c. Activity – Seek exemption from Ministry of Health for mandatory policy that newly trained interns must serve in rural areas directly following intern year.

**3. Every year, prepare residents to pass appropriate membership or fellowship exams designated for certification by COSECSA.**

- a. Activity: Prepare residents by biweekly didactics and biannual in-house written and oral exams.

**4. Every year, allow residents to have access to digital surgical resources.**

- a. Activity: Gain access to SCORE (General Surgery Resident Curriculum Portal) portal and the Royal College of Surgeons of Edinburgh portal

***Long-term Objectives***

**1. Maintain tri-institutional partnership for long-term.**

- a. Activity - Continuous collaboration and agreement on set objectives.

**2. Every 5 years, re-accreditation of the 5-year Fellowship program by COSECSA.**

- a. Activity – Improve on infrastructure recommendations from last evaluation.

**3. Maintain financial sustainability for the long-term.**

- a. Activity – Ministry of Health follow through with plan to fully fund resident salaries beginning in 2015.
- b. Activity – Financing appropriate areas with research grants
- c. Activity – Develop a public-private model within the hospital to help fund the program and salaries.

### Logic Model for Goal: Develop a sustainable surgical training program in Malawi

Resources/Inputs	Activities	Outputs	Outcomes	Impact
*COSECSA Curriculum and Accreditation  *Visiting and local surgeons  *Kamuzu Hospital and staff  *Malawi College of Medicine for graduating medical students and interns  *Digital Library  *Tripartite partnership between UNC, Malawian Ministry of Health, and Norwegian government financially and decision-making	*Designing and implementing curriculum  *Teaching biweekly didactics and facilitating in-house examinations  *Recruiting interns from Malawi College of Medicine  *Continue access to digital library  *Maintain and seek funding for sustainability	*Set curriculum for residents  *High pass rate for certification by COSECSA  *Re-accreditation of the program  *High number of competitive and promising applicants to the program  *Improved learning from digital resources  *Fully funded program	*Certified surgeons ready for practice and leadership in training new residents  *Continued Accreditation by COSECSA  *Sustainable surgical training program	*Increase in surgical workforce and leadership  *Program as prime example for surgical training program in Africa

**Goal: Increase and maintain the surgical workforce in Malawi.**

***Short-term Objectives:***

- 1. Every year, increase surgical personnel at Kamuzu Central Hospital.**
  - a. Activity – Increase in personnel by help transitioning graduating residents to become attendings.
  - b. Activity – Obtain a job as a surgeon from the Ministry of Health.

***Long-term Objectives:***

- 1. Challenge and prepare residents to become leaders in surgery in the Malawi setting.**
  - a. Activity – Teach necessary administrative skills within and outside the surgical team in the hospital.
- 2. As the surgical workforce increases, enable certified surgeons to build and develop programs at other central or district hospitals.**
  - a. Activity – Support and teach how to provide sustainable surgical services and development of a sustainable surgical training program.
  - b. Activity – Receive accreditation by COSECSA at other hospitals



### Logic Model for Goal: Increase and maintain the surgical workforce in Malawi.

Resources/Inputs	Activities	Outputs	Outcomes	Impact
*Surgical training program  *Tripartite partnership for education and financing  *Ministry of Health of Malawi	*Surgical leadership at KCH teach and enable residents to become surgical leaders  *Graduating residents apply for a job from Ministry of Health  *Graduated certified surgeons work at other central or district hospitals	*Graduated and certified surgeons prepared to lead surgical teams in and outside of KCH  *Certified surgeons will be given a job by the ministry of health	*More surgical manpower at KCH and other hospitals  *Increased ability to teach and lead new residents	*Increase and maintain surgical workforce in Malawi  *Provide and improve surgical care in other areas of the country

### Goal: Develop global surgical research capacity to benefit all stakeholders.

#### *Short-term Objectives*

1. Every year, involve local residents and surgeons in current active research.
2. Every year, teach research methodology and how to apply for international research grants.
3. In one year, residents and attendings will produce original research and first author publications.

### **Logic Model for Goal: Develop global surgical research capacity to benefit all stakeholders.**

Resources/Inputs	Activities	Outputs	Outcomes	Impact
*UNC surgeons, residents, medical students  *Grants and IRB approval  *Trauma, Burns, and HIV registry at KCH  *Local attendings and residents	*Apply for grants and IRB approval in US and Malawi  *Collect patient information for registries  *Collaboratively develop and execute research projects	*Receive grant funding and IRB approval  *Maintain database registries  *Original research and publications	*Using research to benefit the surgical training program curriculum and surgical services provided at KCH  *Equip Malawian surgeons to become leaders in global surgery research	*Improve surgical care in Malawi and in Africa

### **Implementation**

#### **Develop a sustainable surgical training program in Malawi.**

The surgical training program is in its fourth year of operation with a set curriculum approved by the COSECSA (see curriculum outline). The curriculum varies yearly with the addition of visiting surgeons for specialty training periods. Biweekly didactics and in-house examinations are taught by permanent and visiting surgeons. Resident responsibilities are outlined in their training contract (see training contract). Recruitment of interns from the Malawi College of Medicine can be done internally through the placement of interns at Kamuzu Central Hospital. An early recruitment strategy would be for medical students from the Malawi College of Medicine to rotate through KCH as a surgery elective. Starting in 2013, there will be 30 medical students rotating through the KCH surgery department every 3 months. Continued access to the digital library will ensure educational support for the trainees. Currently, the

surgical training program provides each resident with a scholarship loan of \$1000 US dollars per month in Malawi Kwacha. Half of the loan is funded by the Ministry of Health and half is funded by UNC and the Norwegian government. In order to ensure program sustainability, the Ministry of Health has agreed to fully fund resident salaries beginning in 2015. While grant funding will be supportive, implementation of a public-private model of care will be an appropriate initiative to ensure financial sustainability.

### **Increase and maintain the surgical workforce in Malawi.**

The surgical leadership at KCH consists of the head of the surgery department, the director of postgraduate training, and visiting surgeons from UNC and the Haukeland Hospital. In order for the residents to practice within the country of Malawi, they must apply for a job from the Ministry of Health. The Ministry of Health must invest in providing surgical jobs within the country. The newly graduated surgeons will increase the surgical manpower at KCH and at other central or district hospitals in the country. The program is essentially training trainees to become trainers of the new and growing surgical workforce in Malawi. The surgical training program and surgical care in the country will be enhanced by the production of competent surgical leaders.

### **Develop global surgical research capacity to benefit all stakeholders.**

Surgical research will be implemented at KCH through equal partnership and responsibility of gathering and analysis of original data. All parties will play a role in applying for grants and IRB approval in each respective country.

## **Sustainability**

Sustainability will depend on continuous collaboration, effective communication, and financial stability. While most implementation of the program will be on-site, UNC and University of Bergen will continue to prepare and reevaluate in and out of the country. Successful implementation can only be achieved with agreement on set goals and objectives. All stakeholders are responsible for the execution of activities and producing outputs and outcomes for a lasting impact.

## **Malawi Surgical Initiative at Kamuzu Central Hospital: Program Evaluation Plan**

### **Rationale and Approach to the Evaluation**

The Malawi Surgical Initiative will be graduating the first class of residents in 2014. Since 2009, the surgical training program has not only expanded in the number of residents, but also in the number of surgeons and ancillary staff. With increased personnel and infrastructure, there has been a significant increase in surgical capacity and research. With the rapid growth of the surgical capacity and the anticipated change in financial responsibility in 2015, the stakeholders would like to reassess and evaluate the surgical initiative in order to find ways to improve the current program and to ensure the program is sustainably, equitably, and effectively meeting its goals, objectives, and intended outcomes. Also at this time, the surgical training program is also due for reaccreditation by the College of Surgeons of East, Central and Southern Africa.

Recently, developing surgical training programs in Africa has become a popular initiative for many global partnerships. However, there are not many evaluations of these programs. We believe that the Malawi Surgical Initiative can be seen as an example of such initiative. We hope that the evaluation will give insight into success and challenges in creating sustainable and equitable surgical training programs in Africa and globally.

My role in the process is to help create a formal program and evaluation plan and to conduct the evaluation of the program. My goal as the evaluator is to help create an evaluation that will be useful and integral in the success of the program. I believe I am more of an external evaluator who has been directly working with an internal consultant and partner, Dr. Anthony Charles of UNC Department of Surgery. I eventually will be working with the other partners in person and via technology. An external evaluator would be valuable for this evaluation due to the

time and responsibility constraints of the partners and stakeholders. Also, an external evaluator would be less likely to be biased with collection and presentation of the data. However, although I do not play a role in execution of the program, as a UNC medical student interested in surgical capacity building in Africa, I am an advocate for the Malawi Surgical Initiative. Therefore, it will be important to try to not allow biases when creating the evaluation tools and conducting the evaluation. Key skills that I contribute to the evaluation process would be to apply my knowledge gained during my MPH year, specifically with program planning and evaluation and research methods. I am aware of my lack of experience with formal evaluations in the global setting, but I am equipped with resources and support available through the UNC Gillings School of Global Public Health. Importantly, the evaluator must be flexible to support and help facilitate the collaborative environment among the partners. The evaluator should be culturally aware, sensitive, and respectful to all cultures and persons present in the field.

As an external evaluator living in the United States, it will be necessary to visit Kamuzu Central Hospital (KCH) in Malawi to gain a better understanding of program dynamics on the ground and to meet all pertinent stakeholders. The pertinent stakeholders involved in creating the evaluation are the representatives of the partnership: Dr. Anthony Charles of UNC Department of Surgery, Sven Young of Haukeland Hospital/University of Bergen, and the KCH Department Head of Surgery and Hospital Director representing KCH and the relationship with the Ministry of Health. In Malawi, I will work with all stakeholders to finalize the program and evaluation plan and if feasible, conduct the evaluation on the ground. In agreement with CDC's framework for program evaluation, in order for this program plan and evaluation to be useful, feasible, and accurate, the external evaluator, with propriety, should actively involve all stakeholders of the tri-partite partnership.<sup>16</sup> The first draft of the program plan and evaluation will be written with

consultation from one of the internal partners and will be distributed and presented to the other stakeholders for modification and final agreement by all stakeholders. Stakeholder involvement will be key to a useful and successful evaluation of the program.

Potential challenges to the evaluation will be time constraints with execution of the evaluation on the ground. The draft of the program and evaluation plan will be sent electronically to the partners for input and feedback before meeting in person. A stakeholders meeting will be planned at KCH to finalize the program and evaluation plan before conducting the evaluation. A challenge will be to find time to conduct interviews and other data collection amidst the busy surgical schedule during the week. If necessary, due to the qualitative approach of the evaluation, we may be able to collect data electronically.

### **Evaluation Study Design/ Evaluation Methods**

The study design will be observational with qualitative and quantitative methods. Given that the evaluation plan is organized after the implementation of the program, it is not possible to collect pre-test data for qualitative methods. Only the pre-test data for the quantitative analysis of surgical caseloads before and after program implementation is available.

Qualitative methods will include semi-structured individual interviews and surveys with open-ended questions. I will conduct interviews and surveys with the partners and faculty surgeons. Due to time constraints of the participants, only surveys will be conducted for residents and medical students. Interviews will be recorded, transcribed, and coded to identify common themes. Quantitative methods will include a retrospective analysis comparing the operating room caseloads before and after program implementation and number of caseloads completed by each resident.

The evaluation will be completed after final agreement of the evaluation plan with the stakeholders. Ideally, this will occur before or after my first meeting with stakeholders in Malawi. Interview times will be scheduled in advanced. The surveys will be distributed and completed during one of the residents' group didactic session. Analysis of the evaluation data will occur after I return to the United States from Malawi.

### **IRB Considerations**

IRB approval may be necessary in order to complete and publish the program evaluation. The IRB application should be considered for exempt review due to the minimal risks for human subjects. All interviews, surveys, and caseloads will be anonymous and confidential. Other than participant status in program, such as "resident" or "partner," identifiers will be removed from all data. All participants will be given written consent forms before participating in the evaluation. All electronic communication and data will be secured in a locked file and computer. All recordings from interviews will be erased after transcribing. An IRB exemption application will be sent to both the UNC IRB and the Malawian IRB committees.

### **Evaluation Planning Tables**

The following are evaluation tables with potential implementation and outcome evaluation questions aligned with each goal and objective of the program. The evaluation questions will be incorporated into the interviews and surveys.



**Goal: Develop a sustainable surgical training program in Malawi.**

**Short-term Objectives**

**1. Every year, implement curriculum and schedule changes as necessary.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT(S)</b>	<b>EVALUATION METHODS</b>
How often does the curriculum change? Is it sufficient?	Partners	Interview
Is the curriculum locally relevant?	Partners Residents	Interview Survey
On average, how many cases does each resident complete in a year?	Partners	OR Case log
Has there been an increase in surgical cases since the beginning of MSI?	Partners	OR Case log
Are the residents adequately prepared to do surgeries when they graduate?	Partners Graduating Residents	Interview Survey
Are the biweekly didactics effective in teaching residents?	Partners Residents	Interview Survey
Do the additional skills courses enhance the learning experience? If so, then how?	Residents	Survey
Is there any feedback/evaluative process in place for residents and surgeons?	Partners Residents	Interview Survey
How can the curriculum be improved?	Partners Residents	Interview Survey

**2. Every year, recruit new residents into the program.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT(S)</b>	<b>EVALUATION METHODS</b>
How do you recruit residents into the program?	Partners	Interview
How many interns apply to the program?	Partners	Applicant database
Are all of the residents from the Malawi College of Medicine?	Partners	Interview
What criteria do you use when choosing residents?	Partners	Interview
Do medical students rotating through KCH Surgery help with recruitment?	Partners	Interview
How can the recruitment efforts be improved?	Partners	Interview
Are medical students interested in surgery as a career?	MCM Medical students	Survey
Are medical students interested in applying to the KCH surgical training program?	MCM Medical students	Survey
What about the program appeals to medical students who plan to apply to the program?	MCM Medical Students	Survey
What are suggestions for improvement in the recruitment efforts?	MCM Medical Students	Survey

**3. Every year, prepare residents to pass appropriate membership or fellowship exams designated for certification by COSECSA.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT(S)</b>	<b>EVALUATION METHODS</b>
What are ways the program is preparing residents for COSECSA exams?	Partners Residents	Interview Survey
Are the biweekly didactics effective in preparing residents for exams?	Partners Residents	Interview Survey
Do in-house exams correlate with COSECSA exams?	Partners FCS Residents	Interview Survey
Do residents feel prepared to pass the COSECSA certification exams?	Residents	Survey
What are new ways that the program can prepare residents for COSECSA exams?	Partners Residents	Interview Survey

**4. Every year, allow residents to have access to digital surgical resources.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT(S)</b>	<b>EVALUATION METHODS</b>
How often do the residents/surgeons use the digital library?	Surgeons Residents	Survey
What digital resources do the residents/surgeons use the most? Clinical or Research resources?	Surgeons Residents	Survey

Are there any digital resources residents/surgeons would like to access?	Surgeons Residents	Survey
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***Long-term Objectives***

**5. Maintain tri-institutional partnership for long-term.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT(S)</b>	<b>EVALUATION METHODS</b>
Do you think this partnership has been effective?	Partners	Interview
What role does each partner play within this partnership?	Partners	Interview
How can this partnership be improved?	Partners	Interview

**6. Every 5 years, re-accreditation of the 5-year Fellowship program by COSECSA.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT(S)</b>	<b>EVALUATION METHODS</b>
What has changed since the last accreditation?	Partners	Open-ended survey
Has the program met all COSECSA requirements?	Partners	Survey
Is the program ready for the re-accreditation?	Partners	Interview

**7. Maintain financial sustainability for the long-term.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT(S)</b>	<b>EVALUATION METHODS</b>
Is the program financially sustainable?	Partners	Interview
Will the Ministry of Health be able to cover all residents' salaries starting in 2015?	Hospital Director/Ministry of Health	Interview
Is the department ready to establish a public-private model?	Partners	Interview
What are some successes to financial sustainability?	Partners	Interview
What are some barriers to financial sustainability?	Partners	Interview
How do the partners suggest the program maintain financial sustainability for the long-term?	Partners	Interview

**Goal: Increase and maintain the surgical workforce in Malawi.**

***Short-term Objectives***

**8. Every year, increase surgical personnel at Kamuzu Central Hospital.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT</b>	<b>EVALUATION METHODS</b>
Has there been an increase in surgical personnel at KCH?	Partners	Interview
Do the graduating residents plan to stay at KCH after finishing residency?	Graduating Residents	Survey

Does KCH have the capacity to have more surgeons?	Partners	Interview
How many surgeons would be considered full capacity at KCH?	Partners	Interview
How has the program influenced the community?	Partners Residents	Interview Survey

### *Long-term Objectives*

#### **9. Challenge and prepare residents to become leaders in surgery in the Malawi setting.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT</b>	<b>EVALUATION METHODS</b>
What leadership positions do the residents hold in the program?	Partners Residents	Interview Survey
Do the graduating residents feel prepared to lead surgical teams in and outside of KCH?	Graduating residents	Survey
Does the curriculum include leadership development?	Partners Residents	Survey

**10. As the surgical workforce increases, enable certified surgeons to build and develop programs at other central or district hospitals.**

EVALUATION QUESTIONS	PARTICIPANT	EVALUATION METHODS
Are certified surgeons able to develop programs at other central or district hospitals?	Partners	Interview
Are residents interested in working at other central hospitals?	Residents	Survey
Are residents interested in working at district hospitals?	Residents	Survey

**Goal: Develop global surgical research capacity to benefit all stakeholders.**

***Short-term Objectives***

**11. Every year, involve local residents and surgeons in current active research.**

EVALUATION QUESTIONS	PARTICIPANT	EVALUATION METHODS
How many residents are involved in research?	Partners/Surgeons Resident	Survey
How much time do surgeons/residents spend on research?	Surgeons Resident	Survey
Do residents/surgeons have enough time to do research?	Surgeons Resident	Survey
What role do the residents/surgeons have in research project(s)?	Surgeons Resident	Survey

Has the trauma, burns, and HIV registry been helpful with conducting research?	Surgeons	Survey
How can the program improve and maintain the database registries?	Partners/Surgeons Resident	Interview Survey

**12. Every year, teach research methodology and how to apply for international research grants.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT</b>	<b>EVALUATION METHODS</b>
Is research methodology taught within the curriculum?	Partners/Surgeons Residents	Survey
Have you applied for international research grants?	Surgeons Residents	Survey
Have surgeons/residents help submit for IRB approval for a project?	Surgeons Residents	Survey
How was UNC residents'/medical students' experience doing research at KCH?	UNC Residents/medical students	Survey
How can the program improve in involving faculty surgeons and residents in research projects at KCH?	Partners/Surgeons Residents UNC Residents/medical students	Survey



**13. In one year, residents and surgeons produce original research and first author publications.**

<b>EVALUATION QUESTIONS</b>	<b>PARTICIPANT</b>	<b>EVALUATION METHODS</b>
Will residents/surgeons be able to produce original research and first author publications in 10 years or less?	Partners	Interview
Do residents/surgeons have any ideas for potential research projects?	Surgeons Residents	Survey
What can the program do to help support research project ideas?	Surgeons Residents	Survey
How would the research project benefit the surgical training program and surgical services provided at KCH?	Surgeons Residents	Survey

**Dissemination Plans**

The program evaluation results will be collected and a report will be generated to give program feedback and recommendations for implementation of future goals and objectives. Results will be sent and presented to the program partners and made available to all stakeholders in the program. The program evaluation will be presented to the Ministry of Health for future implications regarding financial sustainability.

With agreement and collaboration of the program partners, results from the program evaluation will be submitted for publication in the World Journal of Surgery. Dr. Anthony

Charles will be presenting the evaluation at the 6th Annual Alliance for Surgery and Anesthesia Presence (ASAP) meeting on September 6-8, 2013.

### **Malawi Surgical Initiative at Kamuzu Central Hospital: Discussion**

While surgery in resource-poor countries has been underrepresented in global public health efforts, the need for surgical expertise and an increase in the surgical workforce worldwide is unequivocal. Surgical conditions significantly contribute to the global burden of disease, but only recently have global public health efforts been focused on improving the surgical infrastructure in developing countries. With globalization, more medical students and trainees in developed nations have spurred academic institutions to get involved in addressing the surgical needs in resource-poor areas.<sup>17</sup> More importantly, there is little question by most academic surgeons as to whether surgery be added to the global health agenda or whether US academic institutions partners should partner with institutions in developing countries.<sup>18</sup> The question to be addressed now is “how” to best address this need.

With only 15 trained surgeons in a country of 14 million people, Malawi needed to build its surgical workforce and capacity. The Malawi Surgical Initiative was created to address the surgical workforce shortage and to increase surgical capacity in the country. This program and evaluation plan of the Malawi Surgical Initiative may be an example of answering the “how” question. Physical components, such as operating rooms and surgical supplies, will always be needed in any surgical program. The strength of this program is the shared responsibilities and effective communication between the members of the tri-partite partnership. The program focuses on co-learning and collaboration between all parties involved. Another strength of the

program is its focus on the country's needs foremost and the trust that has been built upon not only good intentions, but equitable and appropriate actions.

Challenges to successful program implementation include the potential of the brain drain and financial instability. The evaluation will be instrumental in assessing these challenges and creating ways to prevent them. It will also aid in quality improvement in the program and ensure that the program is sustainably, equitably, and effectively meeting its goals. The evaluation will be shared with the surgical community worldwide in hopes to give insight into success and challenges in creating sustainable and equitable surgical training programs in Africa.

### **Acknowledgements**

With regards to the Malawi Surgical Initiative, this program and evaluation plan would not have been possible without the guidance and input of Dr. Anthony Charles and the UNC Department of Surgery. I wish to thank my MPH mentor and instructor of the Program and Evaluation course, Dr. Diane Calleson, for continual guidance and support. I would also like to acknowledge the staff at the Odom Institute for assistance on interview and survey design. Many thanks to the Public Health Leadership Program in the Gillings School of Global Public Health for giving me the opportunity to apply newly learned skills and to write this paper.

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## Appendix

### Personnel

Minister of Health – Khumbo Kachali

KCH Hospital Director- Nordeen Alide, MD

UNC Department of Surgery – Anthony Charles, MD, MPH, FACS

University of Bergen, Haukeland University Hospital: Sven Young, MD

Head of KCH Surgery Department – Carlos Varela MB, ChB

Director of Postgraduate Training – Leonard Banza MB, ChB

Surgical Attendings – Raul Canterra, MD

Arturo Muyco, MD

Mordecai Gamer, MD

Yin Miao, MD

Sven Young, MD

Visiting Attendings - Stephanie Lueckel MD- Consultant General Surgery

Carol Shores MD – Visiting Otolaryngologist- UNC

Clara Lee MD- Visiting Plastic Surgeon- UNC

Anthony Charles MD- Visiting General and Trauma/Critical Care- UNC

Dr. Burmeister-Rother, MD- Consultant Anesthesiologist

Carlton Zdanski MD, Consultant ENT

Mike Sinclair MD, Consultant General and Thoracic Surgeon

Joseph Fulton, MD, Visiting Vascular Surgeon - UNC

4<sup>th</sup> year Residents: Tiya Chilunjika MB, ChB – Peds Surgery

Rahim Ibrahim MB, ChB \*

\*Excused from program

Gift Mulima MB, ChB

3<sup>rd</sup> Year Residents: Chifundo Kajombo MB, ChB

Enock Ludzu MB, ChB

Kumbukani Manda MB, ChB

Judith Mkwaila MB, ChB

Boston Munthali MB, ChB

2nd Year Residents: Charles Mabedi MD

1st Year Residents: Vanessa Msosa MD

Keller Kumwenda MD

Michael Phiri MD

Visiting Residents –Jonathan Samuel, MD - UNC

Michelle Kiser, MD - UNC

Javeria Qureshi MD- UNC

Jared Tomlinson MD – University of Rochester

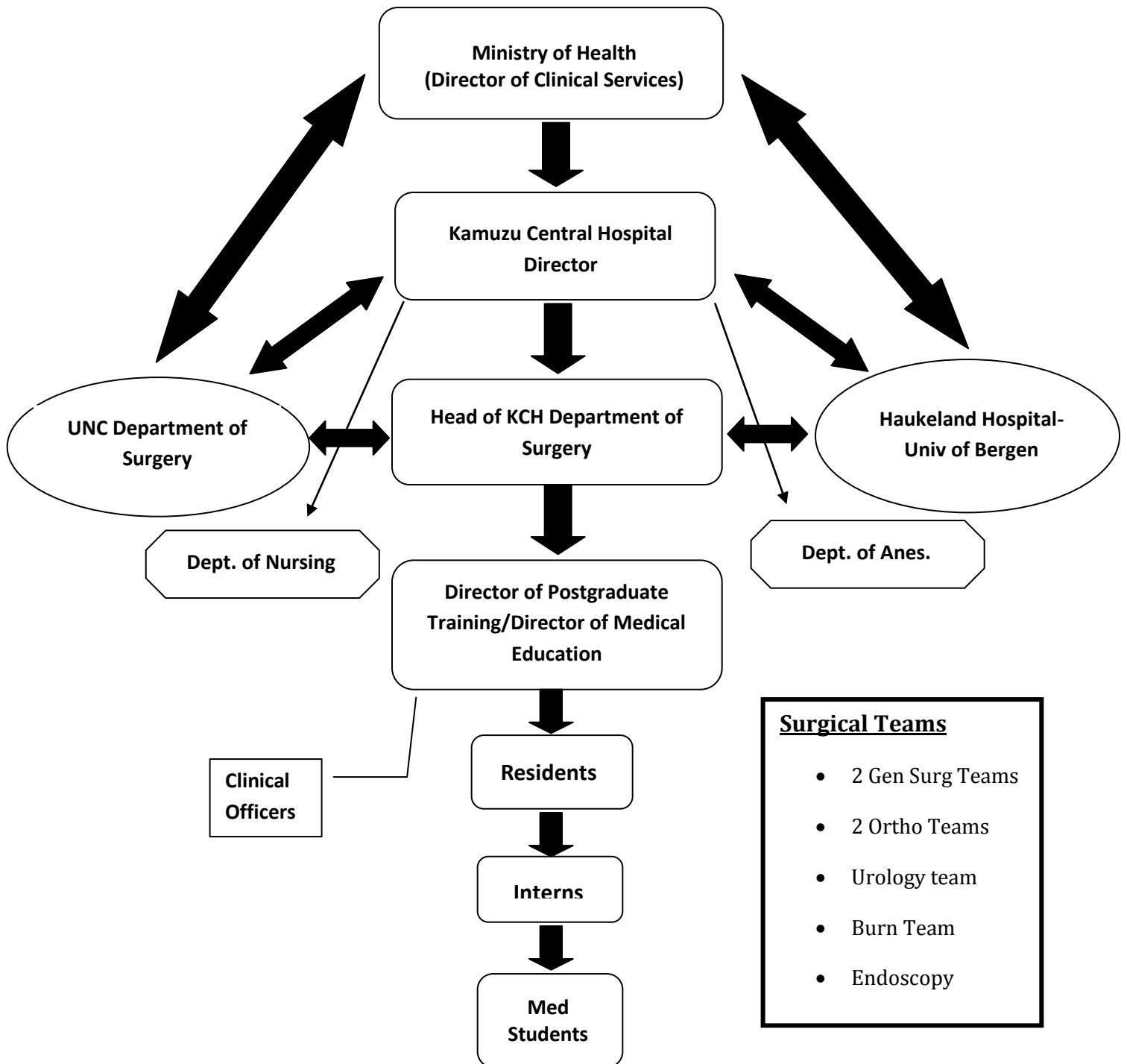
Laura Boschini, MD - UNC

Anna Tyson, MD - UNC

Lead Clinical Officers: Nelson Msiska

Stephen Mjuweni

**Organizational Chart of the KCH Malawi Surgical Initiative**



## **Malawi Surgical Initiative: Curriculum**

### **MCS (ECSA) Rotations KCH Residents**

#### **Framework:**

- MCS (ECSA) requires at least six months of general surgery including emergencies and at least six months of orthopedics including trauma. The remainder of the time may be spent in any surgical specialty (including general surgery and orthopedics). Involvement in research is encouraged but should not detract from time spent in clinical surgery
- No requirement for GYN
- Ideally, orthopedic rotations in year 2. If we have 3 residents, each could do 2 months at Queen Elizabeth and 4 months at KCH. This gives continuous ortho coverage at KCH.

#### **Year 1 (implemented July 2011)**

- Basic Surgical Skills Course
- Critical Care or Trauma Course
- 4 months unit 1 KCH
- 4 months unit 2 KCH
- 2 months urology KCH
- 2 months pediatrics KCH (depends on staffing a third unit)

#### **Year 2 (implemented July 2012)**

- 4 months orthopedics at KCH
- 2 months orthopedics at Queen Elizabeth
- 4 months burn unit KCH
- 1 month ICU at KCH

### **FCSgen (ECSA) Rotations KCH Residents**

#### **Framework:**

- Within years 3, 4 and 5, required one and one half years adult abdominal surgery
- Remainder *can* be spent on other surgery specialties, such as thoracic, urology, trauma, pediatric, plastics.
- COSECSA does not mention ENT, GYN, neurosurgery, vascular, cardiac
- KCH has urology, trauma, pediatrics, not plastics or thoracic.
- 6 months of the 3 years *may* be spent outside the *region* to a post prospectively agreed on by Exam and Training Committee.



### Year 3

- Start Aug 1.
- Begin Year 3 rotations after the MCS (ECSA) exam in Sept. August and September protected to study for exams
- 2 months at UNC
  - 4 week surgery ICU
  - 2 week burn unit
  - 2 weeks observe surgery- laparoscopic abdominal surgery, plastic reconstructive surgery (particularly large hernias, trauma tissue coverage), head and neck, pediatric surgery, vascular
  - ATLS training
- Research- expect submission of a research paper by end of the year. Protect one day a week for research while at KCH.
- KCH rotations 4 two month rotations with 6 months adult abdominal surgery
  - Abdominal surgery on unit 1 KCH
  - Abdominal surgery on unit 2 KCH
  - Urology at KCH
  - Abdominal surgery at Queens Hospital

### Year 4

- 2 month endoscopy rotation KCH (need flexible colonoscope).
- 1 month anesthesia/ICU rotation at KCH, supported by UNC anesthesia consultants and residents
- Rotations within region for COSECSA requirements
  - 2 months thoracic surgery
  - 1 months plastic surgery, with emphasis on reconstruction surgery
- KCH rotations - 4 months adult abdominal surgery
  - 2 months adult abdominal surgery unit 1
  - 2 months adult abdominal surgery unit 2
  - 2 months pediatric surgery

### Year 5

- KCH - 6 months adult abdominal surgery
  - 3 months adult abdominal surgery unit 1
  - 3 months adult abdominal surgery unit 2
  - 3 months pediatric surgery
- 3 months elective rotation

The following COSECSA documents can be found at: <http://www.cosecsa.org/>

- KCH Surgical Training Program Contract,
- COSECSA Prospectus 2012
- Membership: MCS(ECSA) Regulations and Syllabus ,
- COSECSA Registration for Membership Trainees
- COSECSA FCS General Surgery Regulations and Syllabus,
- COSECSA Registration for Fellowship Trainees
- COSECSA FCS Orthopedic Regulations and Syllabus ,
- COSECSA Logbook
- COSECSA University Assessment Form,
- COSECSA Post-Assessment Form

**UNC 2012-2013 Budget for KCH Surgical Training Program**

<b><u>Unrestricted Revenues and Gains</u></b>	<b><u>Quantity</u></b>	<b><u>Amount per quantity</u></b>	<b><u>Line Item Total</u></b>	<b><u>% of Operating Revenue</u></b>
Net Patient Revenue			\$0	0
Contributions, Donations, etc			\$100,000	100%
<b>Total Operating Revenue</b>			\$100,000	100%
<b><u>Expenses</u></b>				
Resident Salaries	11	\$500	\$5,500	5.5%
COSECSA Program Entry Fee				
MCS	3	\$250	\$750	.75%
FCS	0	\$300	0	
Resident Examination Fees				
MCS	5	\$250	\$1250	1.2%
FCS	2	\$500	\$1000	1%
Travel*	9	\$2000	\$18,000	18%
Surgical Supplies			\$73,500	73.5%
<b>Total Expenses</b>			\$100, 000	100%
<b>Total Income</b>			\$0	
<b>Excess of Revenues Over Expenses</b>	0		\$0	

\*Before MCS exam – Travel to and from:

Basic surgical skills - Blantyre

Applied basic science course – COSECSA

Trauma course -Blantyre

Endoscopy – Blantyre

After MCS –UNC for 6 weeks -trauma, critical care, ATLS, ENT, laparoscopy

### Malawi Surgical Initiative: Timeline

Activity	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Yearly Curriculum											
Recruitment											
Exemption of Rural Obligation											
Biweekly Didactics/Biannual exams											
Access to Digital Library											
Re-Accreditation from COSECSA											
MOH Fully Funding Resident Salaries											
Establish Public-Private Model											
Graduating Residents/New Surgical Personnel											
Active Research											
Original Research/1 <sup>st</sup> Author Publications											

## **Malawi Surgical Initiative: Publications and Presentations**

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## **Malawi Surgical Initiative: Current Research Projects**

### **Burn**

- LA 50 Study – What %TBSA burn with 50% mortality
- Prospective RCT on open vs. closed burn dressings
- Epilepsy and burn incidence and severity (30% patients have seizures)
- Nutritional Supplementation in burns
- Outcome of early debridement and graft in burn patients

### **General**

- Prospective RCT of sigmoid volvulus – Resection vs. colostomy vs. mesosigmoid
- Prospective RCT – use of incentive spirometer with exploratory laparotomy
- Prospective – Upper GI bleeding study
- Retrospective – Characteristics of peritonitis
- Retrospective – Incarcerated inguinal hernias as a marker for surgical access and capacity
- Retrospective – Characteristics of pediatric surgery in Malawi
- Retrospective – Task shifting of pediatric surgical care
- Retrospective – Case volume and case complexity

### **Trauma**

- Geospatial mapping of traumas
- Retrospective analysis of falls
- Incidence of machete wounds
- Seasonal variations of childhood trauma
- Verbal autopsy study

### **Public Health**

- HIV testing and counseling in surgical patients
- Comparison of characteristics of surgical vs medicine HIV patients
- Cost-effectiveness of HIV testing

### **ENT**

- Head and Neck Cancer Study
- Cancer epidemiology in Malawi

**POST GRADUATE TRAINING CONTRACT FOR THE  
SURGICAL TRAINING PROGRAMME,  
KAMUZU CENTRAL HOSPITAL.**

# **POST GRADUATE SURGICAL TRAINING CONTRACT**

## **KAMUZU CENTRAL HOSPITAL**

### **INTRODUCTION**

Welcome to the post graduate training program for surgical specialties under the College of Surgeons of East, Central and Southern Africa (COSECSA), Malawi compass.

The College of Surgeons of East Central and Southern Africa awards Membership (MCS) and Fellowship (FCS) examinations. Approved trainee surgeons shall be trained in the hospitals of the region with guidance and support provided by the College.

Training guidelines, syllabus and protocols documents will be made available to you as separate documents, and you need to familiarize yourself with them.

The training program at KCH includes general surgery and Orthopaedics. But other disciplines like introductory training in surgical urology and ENT speciality are also included as part of the surgical residency training.

Residents are employed by the Malawi government Ministry of Health, and it is important to realise that there is a great responsibility for them. They should realise how important it is for them to take the responsibility for their goals, ultimately to become accredited responsible surgical consultants.

The surgical consultant team is available to the residents for any assistance that they may need for their guidance. The consultant team at KCH is not there to overwork the residents, but to guide them to achieve their goal. The obligation to achieve this is their own responsibility.



This is not a bonding agreement with the Malawi Ministry of health, but a contract document with the training program at Kamuzu Central Hospital.

## **STAKE HOLDERS AND SCHOLARSHIP LOANS**

The surgical residency at KCH is supported by Malawi government, ministry of health in terms of salary, accommodation and other local training programs.

Haukeland University Hospital / the Norwegian Government and the University of North Carolina, Malawi compass give support in terms of surgical equipment, financial support to the residents and training personnel for tutoring and guiding the residents.

The surgical training program at present provides each resident in the program with a study/scholarship loan of US\$ 500 per month paid in Malawi Kwacha at the current exchange rate. The exchange rate is going to be reviewed every 3 months. This study/scholarship loan has been made available to the residents in the expectation that it covers extra expenses not covered by the salary as a result of responsibility that the training ensues.

The study/scholarship loan is given without interest and all debt will be cancelled on completion of five years of service as a surgeon at KCH after passing fellowship (FCS-ECSA) exams. Service at another Malawi public hospital will also qualify for cancellation of debt if the ministry of health makes such an appointment.

Other stakeholders may join in for the support of the training program, but this will always be communicated to the training residents through the training coordinator.

## **RESIDENT RESPONSIBILITIES**

All residents are expected to be present at the morning hand over meeting that takes place at 7: 30 every morning in the designated surgical conference room.

All residents are expected to do their ward round for the surgical unit they are rotating through including weekends and public holidays depending on the arrangement in their respective units.

Residents participate in teaching (e.g. other junior staff, Medical interns, medical students etc.) as this helps them learn as they prepare the tutorial. Residents should always communicate with their senior colleagues about the Emergency cases requiring operative intervention.

## **ON CALL RESPONSIBILITIES**

On call duty starts at 8 am on a particular day till the next morning at 12 noon. Residents are expected to be available 28 hours in the hospital when on call.

After the morning hand over meeting, the residents are expected to sort out the new admitted patients, including operative interventions for the night cases. They should do a ward round with their senior colleagues as necessary on the ward round days before knocking off at 12 noon.

Residents are expected to assist the surgical interns working in casualty especially for the special cases.

Residents should give a report on all operated cases themselves, and are responsible for the report of all new and special cases, during the morning hand over meeting.

## **RESIDENT HOLIDAY**

Residents elect a leader who is supposed to organise the resident holidays according to their annual plan.

The leave days has been numbered as per appointment with the Malawi Ministry of Health.

It is advised that not more than one resident in the same unit goes on a holiday at the same time if possible, and the leave roster should always be available for planning of the running of the department.

Maternity leave days should correspond to the number of leave days approved by the Malawi ministry of Health.

Residents are entitled to a 2 weeks study leave prior to the date of sitting for their exam and shall not be on call for a period of 1 month prior to the exam.

Residents are supposed to be on call 1 in 4 or 1 in 5 days.

## **MISCONDUCT AND TERMINATION OF CONTRACT**

Misconduct includes absenteeism from work without valid explanation, failure to carry out duties as required, holiday extensions without prior arrangement, failure to cooperate with senior colleagues and unprofessional or unethical conduct. Misconduct will be reported to the Head of Department and Director of Post Graduate training, and may result in permanent withdrawal or temporary freezing of study loan payments. In cases of severe misconduct termination of the contract may be considered. (Severe misconduct needs to be defined)

Termination of contract shall follow 2 verbal and 2 written warnings which shall be served by the disciplinary committee. (The disciplinary committee needs to be identified)

Any resident who may decide to terminate his/her training before completing the training or who's contract is terminated because of misconduct will be need to refund the study loan for the time period they have been in training within 6 months. Failure to do so may warrant legal action. Termination of contract, from both parties, must be in writing. The resident must serve a period of three months' notice after the written resignation is received.

The parties approve the above conditions and willingly enter this contract by signing this below;

RESIDENT:

NAME: SIGNATURE: DATE:

DIRECTOR OF POSTGRADUATE TRAINING, KCH:

NAME: SIGNATURE: DATE:

HEAD OF SURGERY DEPARTMENT:

NAME: SIGNATURE: DATE:

**STAKEHOLDER REPRESENTATIVES:**

HOSPITAL DIRECTOR:

NAME: SIGNATURE: DATE:

UNIVERSITY OF NORTH CAROLINA:

NAME: SIGNATURE: DATE.....

NORWEGIAN UNIVERSITY HOSPITALS:

NAME: SIGNATURE: DATE: